



Large scale integration of wind power in Danish Power system

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Large scale integration of wind power in Danish Power system

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DTU wind energy

Large scale integration of wind power in Danish Power system



PhD Objective:

To develop and analyze models and control strategies for wind power plants, which increase the capability of wind farms to provide system services. The emphasis is on active power balancing of future power systems with high wind power penetration.

Focus on:

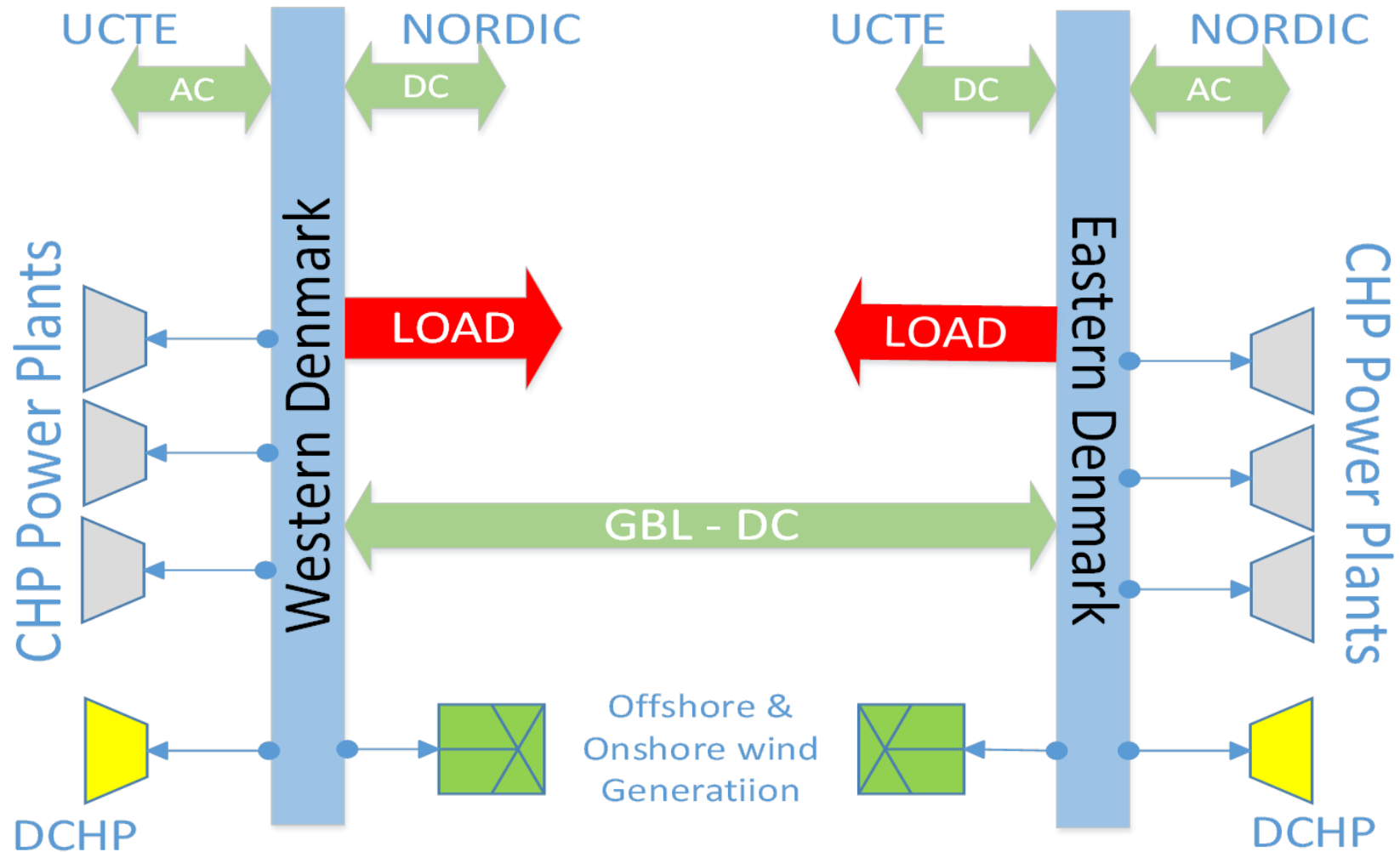
- Integration of Large wind power in power system that can actively participate in primary and secondary frequency support
- Load Frequency Control (LFC) strategies revision to ensure safe and economic operation of power system.
- Considering different case studies and operational conditions to assess the effectiveness of developed strategies

The Danish Power System



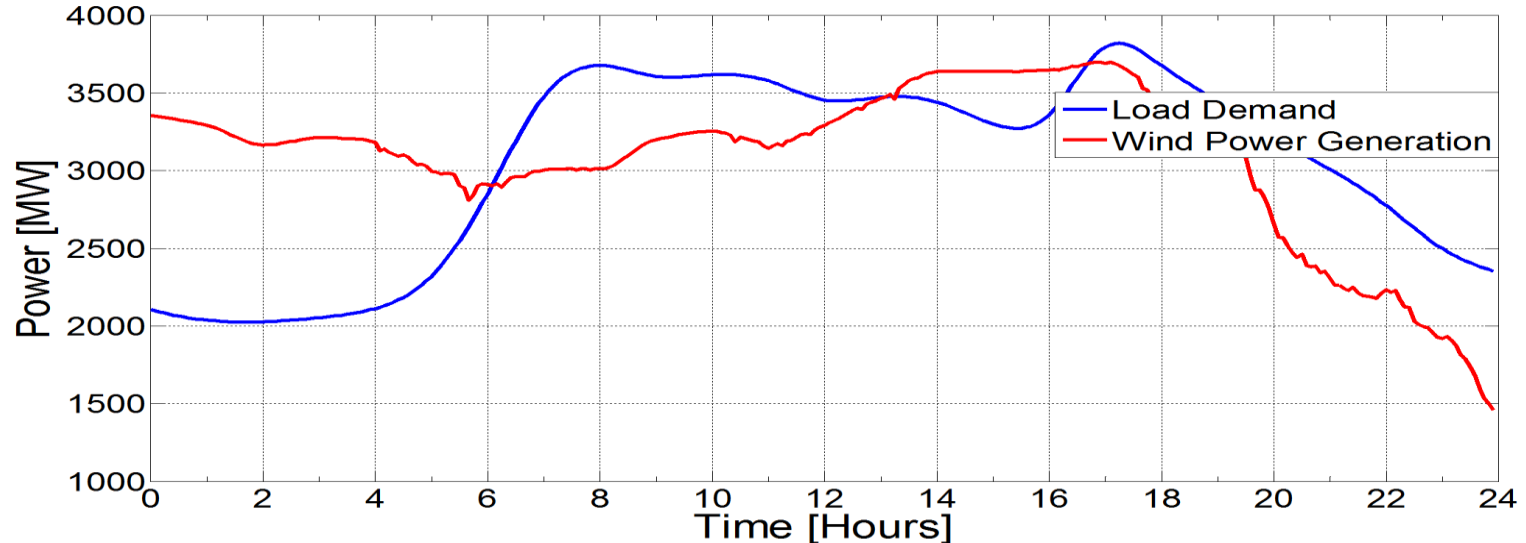
- Denmark is today generating 25.6% of its total electricity demand from wind power and aims to generate 50% by the year 2020
- With high penetration of wind power in Danish power system, the TSO has the task to:
 - Maintain balance between production-consumption
 - Ensure the security and reliability of the power system
 - Minimize the electricity cost concerning the market rules

The Danish Power System model

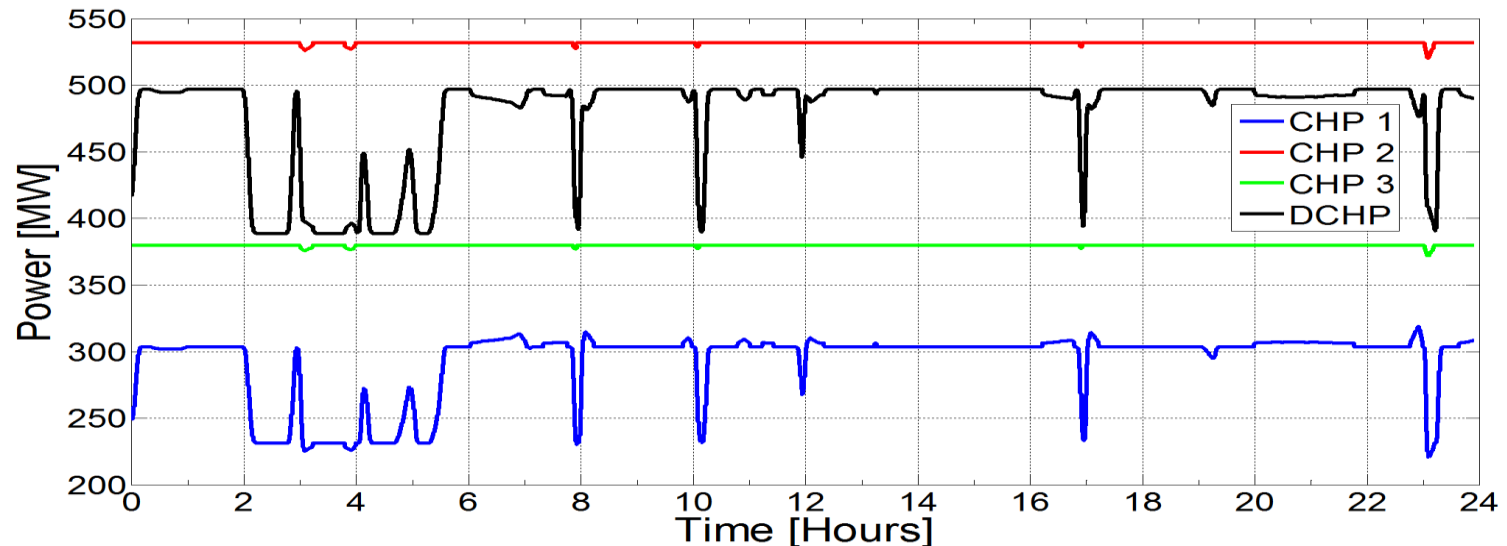


Western Denmark case – 2020

Western Denmark - Load demand and Wind Generation

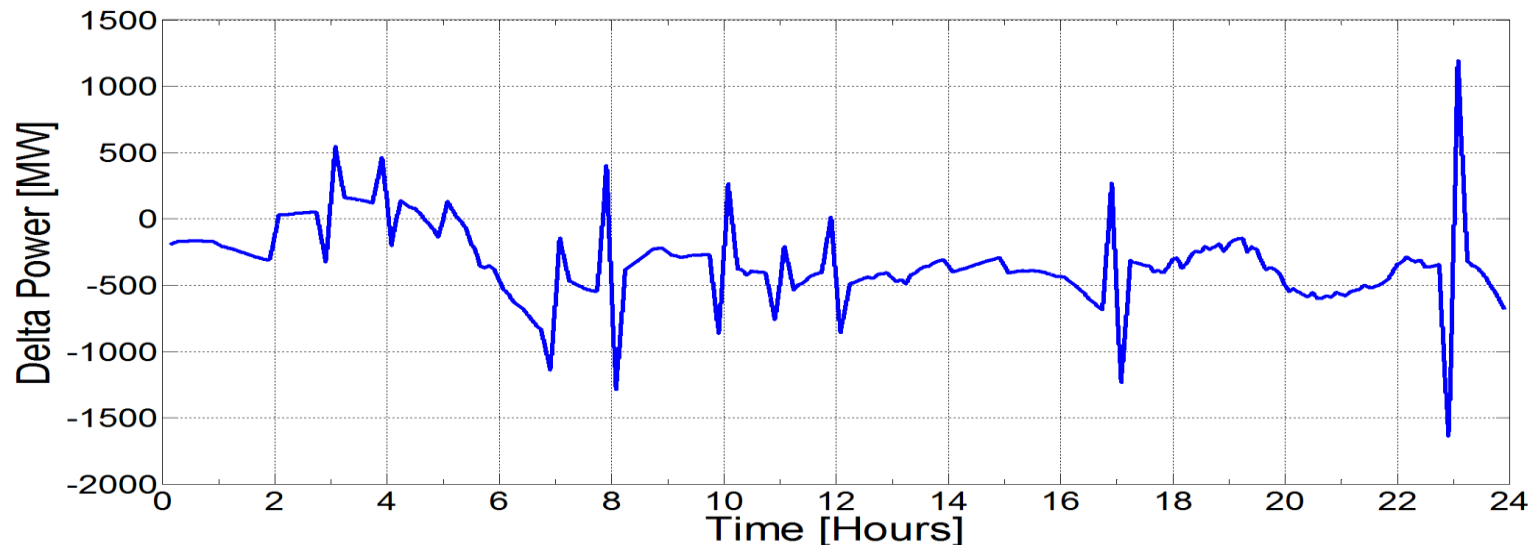


Western Denmark - Generation

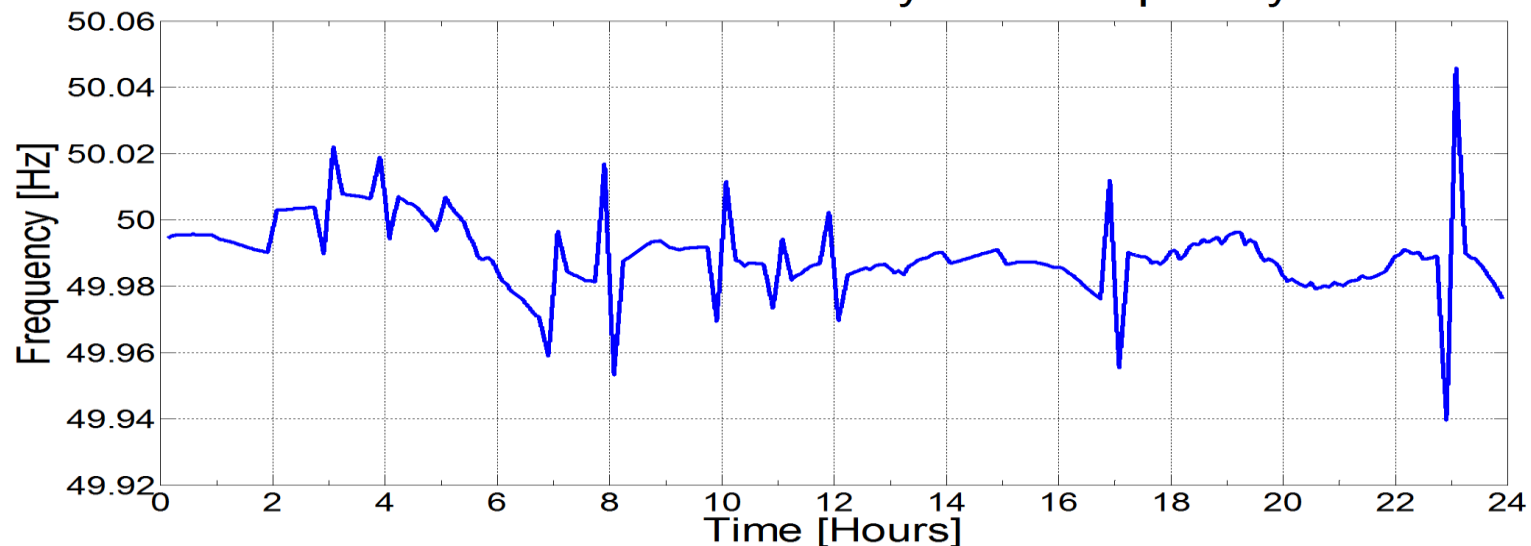


Western Denmark case – 2020

Western Denmark - Power deviation from scheduled level



Western Denmark - System frequency



Thank you